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Division of Mycology and Disease Survey

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DIVISION OF MYCOLOGY AND DISEASE SURVEY

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INTER-HOST TRANSFER ATTEMPTS WITH VARIOUS STRAINS OF THE BULB AND STEM NEMATODE IN UTAH

Gerald Thorne

During the years 1928 and 1929 some inter-host transfer experiments with Ditylenchus dipsaci (Kühn) Filipjev were carried on at the Salt Lake City, Utah, station of the Division of Nematology. Since these have not been previously reported they are here recorded.

Source of Material

Plant material infested with Ditylenchus dipsaci was secured from the following locations:

Alfalfa, Medicago sativa: Salt Lake County, Utah
Daffodil, Narcissus pseudonarcissus: Forest Grove, Oregon
Teasel, Dipsacus fullonum: Molalla, Oregon
Chiloe strawberry, Fragaria chiloënsis: Portsmouth, Oregon
Cultivated strawberry: Oregon - locality unknown
Buckhorn Plantain, Plantago lanceolata: San Mateo County, California
Red Clover, Trifolium pratense: Dayton, Oregon.

Methods

Galvanized soil cans 12 inches in diameter and 16 inches deep were filled with soil to a depth of 12 inches and buried in the ground until only 4 inches projected. Alfalfa, clover, and teasel plants to be infested were secured from seed, planted where desired. The other plants which were to receive the inoculum were secured as young healthy plants, from local sources, and transplanted into the cans, care being exercised to get sufficient plants to shade the soil as well as possible.

To secure inoculum, nematode-infested plants were first soaked in water until large numbers of active nemas were observed. The suspension was then introduced about the plants, which were kept well irrigated by means of a garden hose.

Introductions in 1928 were made April 20 - 25 and in 1929 on April 16 - 23. At this time Ditylenchus dipsaci was very active in the alfalfa fields near Salt Lake City.

Inter-Host Transfers Attempted

Negative results were attained in all of the attempts to transfer Ditylenchus dipsaci from one host to another. The following lists give the transfers attempted:

Alfalfa strain	to	Cultivated strawberry, daffodil, Dipsacus sylvestris, Plantago lanceolata, P. major, red clover, teasel.
Cultivated strawberry strain	to	Alfalfa, daffodil, red clover, teasel.
Daffodil strain	to	Alfalfa, cultivated strawberry, Dipsacus sylvestris, Plantago major, red clover, teasel.
Fragaria chiloensis strain	to	Alfalfa, cultivated strawberry, daffodil, Plantago major, red clover.
Plantago lanceolata strain	to	Alfalfa, cultivated strawberry, Plantago major.
Red clover strain	to	Alfalfa, cultivated strawberry, daffodil, teasel.
Teasel strain	to	Alfalfa, cultivated strawberry, daffodil, Dipsacus sylvestris, red clover.

In 1928 two check plots were planted:
Alfalfa to Alfalfa: Plants moderately infested at first but nemas disappeared in August.
Clover to Clover: No infestation.

In 1929 four checks were made:
Alfalfa to Alfalfa: Moderate infestation extending through the summer.
Alfalfa to Alfalfa: Slight infestation disappearing in July.
Clover to Clover: Moderate infestation disappearing in July.
Clover to Clover: Slight infestation in May disappearing in June.

These indicate the difficulties to be encountered in experimental transfers of Ditylenchus dipsaci.

It was found that if the plots were sprinkled at night and covered with a glass plate to create a high humidity nemas were frequently found on the lower stems and in the leaf axils the following day. But when the glass was removed and the plant surface became dry these nemas became quiescent and could rarely be revived after remaining there one day.

One month after the nemas were introduced it was almost impossible to find them either in the plants or soil, and in a large part of the plots second introductions were made during May and June. With the higher temperatures prevailing during these months the nemas disappeared within two or three weeks.

A supply of infested alfalfa collected in Salt Lake County, Utah, in 1924 was available and in 1929 the following transfers were attempted with this material to determine if the five-year period of dormancy had influenced the host preference of the nemas. In no case was a transfer effected:
Alfalfa to Daffodil, cultivated strawberry, Dipsacus sylvestris, red clover, teasel.

These experiments indicate that in Utah, under small plot conditions there is little possibility of host transfer even from one known host to another. Unfortunately such small plots lack many important ecological conditions wuch as shade and humidity which are present in large fields, and results may be far from comparable to those which would be secured from large field plots.

A most interesting situation was observed at Molalla, Oregon, in April, 1927:

Discarded teasels heavily infested with Ditylenchus dipsaci had been piled along the field border where red clover, dandelion, long leaf plantain, and Hypochaeris radicata were growing. Not a single case of infestation among these four hosts could be found although the soil where they were growing contained myriads of teasel nemas. (Division of Nematology).

NOTES ON PLANT DISEASES IN WYOMING

G. H. Starr

Bacterial blight of beans: Because of an unusually favorable season for its development, bacterial blight of beans was very destructive the past year in the north central irrigated section of Wyoming.

In the first place, beans germinated under adverse conditions, the soil being cold and moisture excessive. In some parts late snows fell after the beans were planted. Continued moisture and driving rains together with hail in some parts made conditions ideal for blight development and spread. There were numerous cases of the effect of driving rains on the spread of the disease. Beans near taller crops or along orchards and windbreaks were protected to the extent that there was very little blight, while farther away there was progressively more blight. All of these factors combined to make this one of the worst blight years since 1928 or, in fact, it may have been the worst on record. Although the summer was quite dry, blight apparently developed and spread at a surprising rate.

In the north central part of the State, the chief bean-growing area under irrigation, all of the blight observed appeared to be the halo blight (Bacterium medicaginis var. phaseolicola). Most of the common varieties--French horticultural, Fullmeasure, Bountiful, Giant Stringless, Surecrop, Red Kidney, and others, were found heavily infected, although some areas were worse than others. In the Powell area, fields were observed that probably would not be harvested on account of severe blight. The loss in this area would approximate 40 - 50 percent loss of the crop. In the area south, around Worland, the loss was less, probably about 20 - 25 percent of the crop. Other areas suffered less and in some the loss was relatively slight.

There was little or no blight found in fields of Great Northern beans in this part of the State, although the previously-mentioned varieties of seed beans were badly infected.

In the southeastern portion of the State, blight of the Bacterium phaseoli type was found in a few fields and gardens. The varieties infected were the Great Norterns and Pinto, which are the chief varieties grown in this dry-land area. Here there was but little loss, in fact, many fields had practically no blight.

Black stem rust of cereals (Puccinia graminis): Although the black stem rust situation was very "unpleasant" in much of the wheat area, there was very little loss from rust in Wyoming, even under irrigated conditions. In the north central part of the State and western mountain-valley areas (both sections irrigated) rust could scarcely be found, except in late-planted fields, and here it was not a serious threat to the crop. In the eastern portion, it was more abundant but not serious and the irrigated plots at the Agronomy Farm had more rust than did any other place observed in the State. Here on a number of varieties, rust was very prevalent and considerable shrivelling resulted. The heaviest infected variety was Federation, which was given a reading of 35 - 75 severity and 100 percent prevalence. Several other varieties were nearly as bad, in fact, eleven varieties ranged from the above figure down to 10 - 50 severity and 100 percent prevalence. These are listed in the order of rust prevalence, from the most to the least rust: Federation, Baart, Dicklow, Bunyip, Kubanka, Garnet, Marquis, Bluestem, Ceres, Kota, and Reliance. Acme was only slightly rusted (trace - 10 on 100 percent) and Hope and H-44 had only a trace.

Barley was less heavily rusted, the heaviest reading recorded being trace - 25 on 100 percent, and the least, no rust. The varieties are listed in the order of rust prevalence: Comfort, Glabron, Beldigiant, Vaughn, Coast, Charlottown, Smyrna, Odessa, Spartan, O.A.C. #21, Trebi, and Horn and Hannchen with none.

There was very little rust found on oat varieties this year. Somewhat more than a trace was found in the Kherson variety; only a trace in Swedish Select, Corriente, Tartar King, Colorado No. 37, Lincoln, and Iogren, while no rust at all was found in Iogold, Banner, Abundance, Silvermine, Victory, Idamine, Markton, and selections No. 592 and 2574.

Bunt of wheat (Tilletia levis): According to the survey made late this summer, bunt was not very prevalent in the State this year. No bunt at all was found in the northern portion or the western mountain valleys. Of the numerous fields examined, 80 percent of them were free from bunt. A few fields near Wheatland however, had high percentages of bunt, one of them with approximately 50 percent of the plants affected.

Oat smut (Ustilato avenae and levis): Most fields of oats were free from smut this year. However, in one field covered smut was found to the extent of approximately 25 percent.

Ergot (Claviceps purpurea): Ergot was unusually abundant in Elymus canadensis, a trace was found in barley.

Sorghum smut: A kernel smut of sorghum was very prevalent this year, as in past years, in southeastern Wyoming where it is grown extensively. A number of fields were inspected that had from 25 to 35 percent of the heads infected with smut.

Crown rot of sugar beets (Rhizoctonia solani): A heavy infection of crown rot was found in one field of sugar beeds near Torrington this season. Several large areas were completely killed out with many affected ones near the borders. It was estimated that there would be about a 50 percent loss in this field. This is the heaviest infection ever noted in Wyoming. In talking with the owner, it was found that sugar beets had been grown continuously on this land for the past 6 or 7 years, and intermittently a few more years in the past.

Phoma leaf spot of sugar beets: In the field also was considerable Phoma leaf spot. (Wyoming Agricultural Experiment Station).

PLANT DISEASES IN MASSACHUSETTS

O. C. Boyd

The following diseases were outstanding during the survey visits in September:

Carrot leaf blight (Macrosporium carotae) continued to spread during the first half of September in certain sections of Essex, Hampden, and Franklin Counties. Earlier in the season, cercospora leaf spot (C. carotae) and the leaf blight were present in about equal amounts. Most of the damage this month was done by the leaf blight alone. Spraying with Bordeaux checked the disease satisfactorily in one Essex County field.

Cauliflower black rot (Bacterium campestre) caused a loss of at least 80 percent in a three-acre field and 25 percent loss on another farm in Franklin County. Crop rotation but not seed treatment was observed by the growers. On a third farm in the same county, club root caused a loss of at least 50 percent of an eight-acre planting. In the same field, other diseases were negligible. Only very slight damage was observed from fungous and bacterial diseases of cauliflower and cabbage in other parts of the State. Fusarium yellows was not observed in cabbage or cauliflower crops.

Celery early blight (Cercospora apii) and late blight (Septoria spp.) continued to develop during the month where careful dusting or spraying was not followed. One moderately heavy infection of fusarium yellows (F. apii) was observed in a field of yellow celery in Essex County. Only a trace was present in an adjacent planting of Pascal. Other instances of this disease were reported in the State this year. Perhaps the unusually high soil temperature during July and August accounted for its prevalence this summer.

Tomato early blight (Alternaria solani) and leaf spot (Septoria lycopersici) developed rapidly on unprotected vines throughout the month in most parts of the State. Late blight (Phytophthora infestans) was not observed in any of the counties during the month. Leaf mold (Cladosporium fulvum), however caused premature defoliation in many trellised fields in Bristol County.

Apples: The scab (Venturia inaequalis) situation looked bad indeed in many orchards during the McIntosh harvest season. The late August and early September rains no doubt favored further fruit infections which will not become evident until later in storage. Although the weather during May and June greatly favored incidence and spread of scab, yet observations in many commercial orchards indicate that the failure of the growers to cover the trees thoroughly was an outstanding factor in allowing the heavy early infections. (Massachusetts State College).

TOBACCO DISEASES IN MARYLAND

E. A. Walker

The accompanying maps (Figs. 47 to 49) show the distribution of downy mildew (Peronospora tabacina) in the seed bed and wildfire (Bacterium tabacum) in the seed bed and in the field during the season of 1937 in the tobacco-growing sections of Maryland.

Mosaic (virus) appeared generally distributed over the entire tobacco growing counties with approximately 4.5 percent of the plants affected. Ringspot (virus) showed only 0.5 percent of plants affected.

In 1936, 37,000 acres were planted to tobacco, while for 1937, 35,500 have been planted, showing a reduction in acreage of 1,500 acres due, possibly, to the infection of downy mildew. (Extension Service, University of Maryland, Sept. 24).

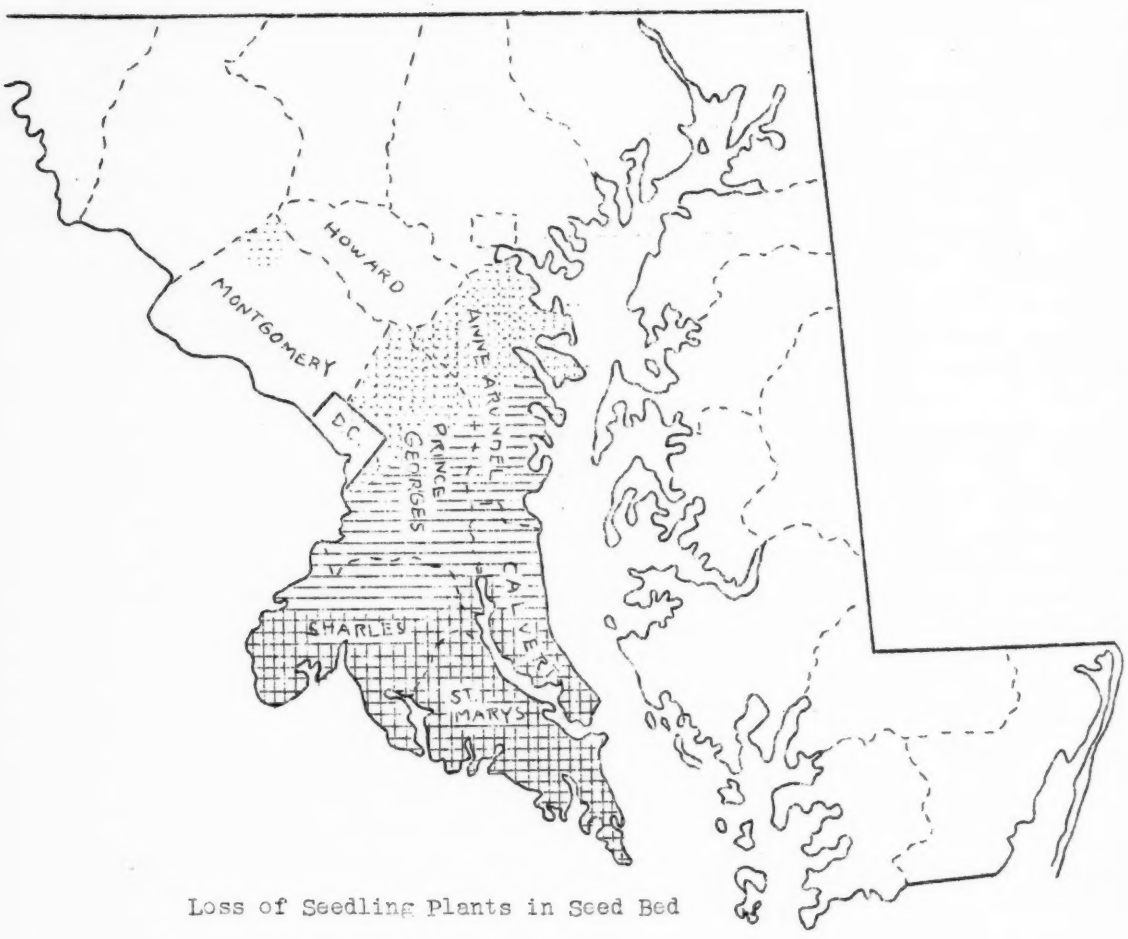
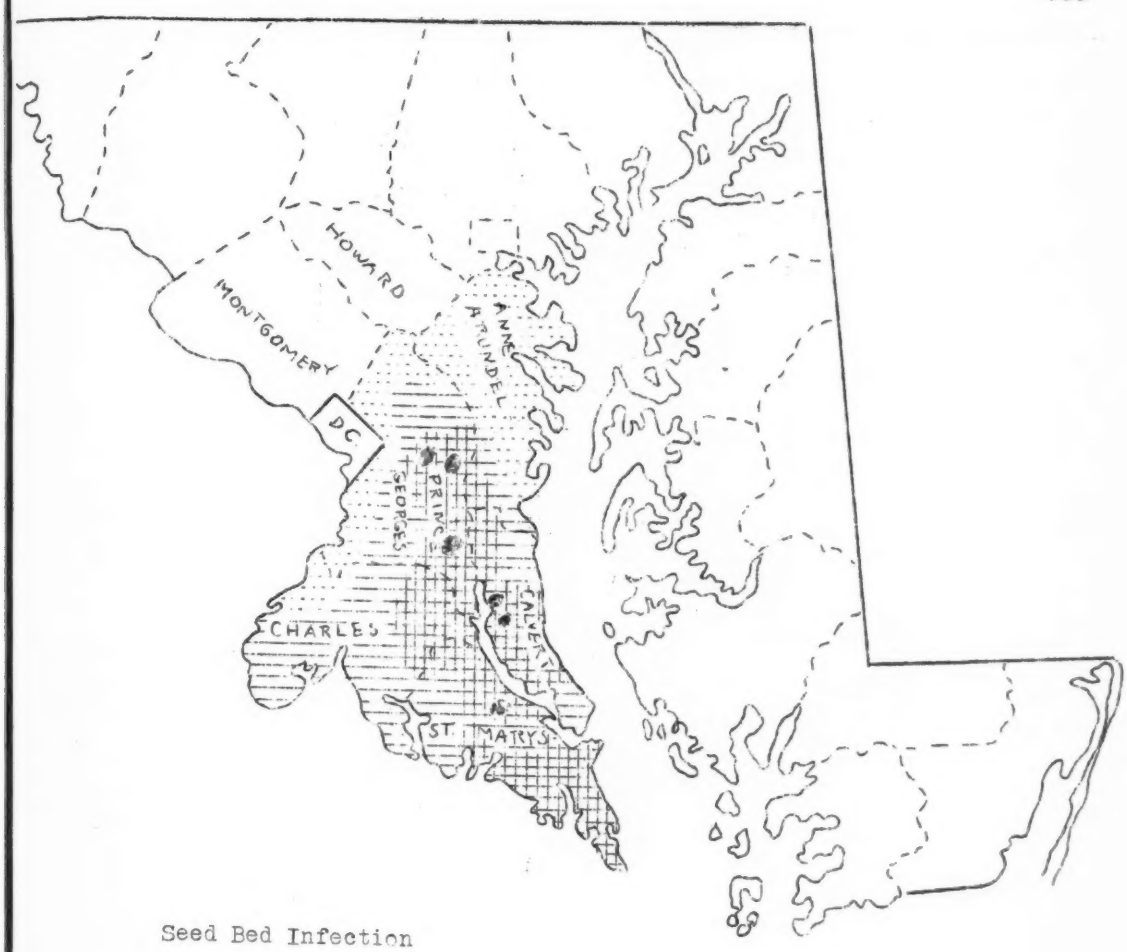


Fig. 47. Tobacco downy mildew survey in Maryland, 1937.



Seed Bed Infection

Mild infection

Moderate infection

Heavy infection

Beds destroyed

Fig. 48. Tobacco wildfire disease survey in Maryland, 1937.

Field Infection

No, to light infection

Moderate infection

Heavy infection

Fig. 49. Tobacco wildfire disease survey in Maryland, 1937.

TOBACCO FIELD SURVEY IN WISCONSIN, 1937

James Johnson

The transplanting of the 1937 crop in Wisconsin was well under way on June 10, and completed for the most part under favorable soil conditions except for some fields which were planted when too wet, which resulted in some checking of growth. Cut-worms in particular reduced the stand in many fields, but on the whole the early season prospects looked promising. In the southern section, drought effects increased as the season progressed. The rainfall at Madison was 3.19, 1.49, 0.67 inches for June, July, and August respectively. The deficiency for August, the critical month for production, was 2.54 inches. Although a large percentage of the crop had made a good early growth, the dry period resulted in an unusual amount of "firing" or drought injury on the lower leaves. Many of the early crops were short at harvest time; while others, especially on poorer soils, grew slowly and matured late. On September 10 only about 50 percent of the crop was harvested. The northern section (comprising chiefly Vernon and Crawford counties) was affected by dry weather earlier in the season, but sufficient rainfall fell in August, the development of the crop being consequently more normal than in the southern section.

The relative temperatures for June were somewhat below the average, but for July and especially for August were considerably above normal. In general, the rainfall and temperature were distinctly unfavorable to disease development.

The increased acreage, requiring the use of more rotated fields for tobacco, resulted in many poor and uneven fields, but not as much characteristic brown root-rot symptoms as was anticipated. Though repeated culture to tobacco is now practiced on many farms, the use of black root-rot (Thielaviopsis basicola) resistant varieties has greatly reduced the amount of this disease. Unfortunately many of the "naturally resistant" types used are not of the Havana-seed type, having largely come into use with the purpose of combating the drought effects in recent years. Havana-seed tobacco and Burley (Judy's Pride) in experimental plots on black root-rot infested soil showed greatly reduced development as compared to resistant strains throughout the season.

Mosaic (tobacco virus 1) was much less common than in normal years and was present in about the same amount as in 1936. Apparently the dry weather and the comparative freedom from storms reduced infection from the soil. Two fields showing 100 percent infection were found difficult to explain on any known basis except that infection had been spread in hand-picking of worms which were abundant this year. The occurrence of the cucumber mosaic virus on tobacco was noted in a few instances. Streak (virus) was frequently seen on isolated plants.

Blackfire (Bacterium angulatum) was much less prevalent in the field than in recent years. Though common in the seed-beds in the spring, field infection did not follow or was only very limited in amount in less than 10 percent of the fields. Wildfire (Bacterium tabacum) was found on only four farms, two of which were known to have been infested in past years. The disease did not spread to the extent of causing any damage. Hail damaged about 400 acres in the northern district, but only minor storm damage occurred in other isolated sections elsewhere in the State. Grasshoppers were the most serious tobacco pest of the year, even though poison bait was commonly applied in surrounding fields. (Division of Tobacco and Plant Nutrition).

RICE DISEASES IN ARKANSAS

W. C. Tullis

Stem rot (Sclerotium oryzae) of rice is more severe in Arkansas this year than for the past two or three years. Numerous reports of loss from lodging in Early Prolific have been reported already this year.

Many fields of Early Prolific were ripe or had been cut by September 1.

Cercospora leaf spot (C. oryzae) was about as abundant as it has been in the past. Some Helminthosporium leaf spot (H. oryzae) was found but very little more than average for the section.

Piricularia oryzae was found in varying amounts on all first-year rice (land seeded for the first time) and to a lesser degree on second-year rice in the vicinity of Brinkley, Arkansas. All types of injury, that is, crown, culm, node, rachis, and leaf infections were found on first-year rice, but only leaf and rachis infections were observed on second-year rice. Specimens of the rotten-neck phase have also been received from Newport.

Reports of the occurrence of straighthead (non-parasitic) from the vicinity of Newport have been received and a few typical specimens have been sent in for determination. (Division of Cereal Crops and Diseases, Sept. 10).

CYPRESS BARK CANKER AND THE MONTEREY CYPRESSES

(From Science Service quoted in Science, n. s. 86, no. 2230, Sept. 24, 1937. Supplement, pages 8-9).

One of America's most famous tree species, Cupressus macrocarpa, the Monterey cypress of California, is threatened with extinction by a fungus disease, the cypress bark canker. Under the leadership of the U. S. Department of Agriculture, with the voluntary cooperation of citizens and the aid

of CCC workers, heroic efforts are now being made to check it.

The region where first defense efforts are being centered is on the Monterey Peninsula itself, where the only living natural stands of Monterey cypress are located. There are two natural groves of the trees, one on Point Lobos, the other on Cypress Point. Thus far the disease has not reached these natural stands, but it has been rampant among ornamental and windbreak plantings of Monterey cypress within a very few miles of them.

Willis W. Wagener, of the Department of Agriculture, has made a critical study of the fungus and the symptoms that indicate its presence in the trees. The fungus is known only as the cause of this particular disease. It is considered to be a new species, and the technical name Coryneum cardinalis has been proposed for it. It gets into the wood of the tree, works its way around through the inner bark and the growth layer, or cambium, until it has the twig or branch completely girdled. A common but not invariable symptom is excessive oozing of gummy balsam.

The disease has now been discovered in planted Monterey cypresses over about two thirds of the entire state of California. It also attacks the imported Italian cypresses, though less virulently. Laboratory experiments have shown that other conifers related to the cypress may be susceptible, but thus far they have not been found infected under field conditions.

If it is found in an early stage, infecting only a few twigs or branches on a tree, it may be stopped by drastic surgery, removing the wood well below the infected place and spraying the foliage heavily with Bordeaux mixture to kill spores that may be there. But if the infection is more extensive, the only price for a safety of trees still unattacked is to cut down and burn the entire infected tree. Citizens, reached by appeals to make this sacrifice for the sake of one of California's greatest rarities and most beautiful scenic features, have voluntarily destroyed their own plantings by thousands.

The advance of the canker toward Point Lobos and Cypress Point has been checked at least for the present. What the future may bring is, in part at least, a matter of vigilance by scientists and citizens alike.

PERSIMMON WILT

Bowen S. Crandall

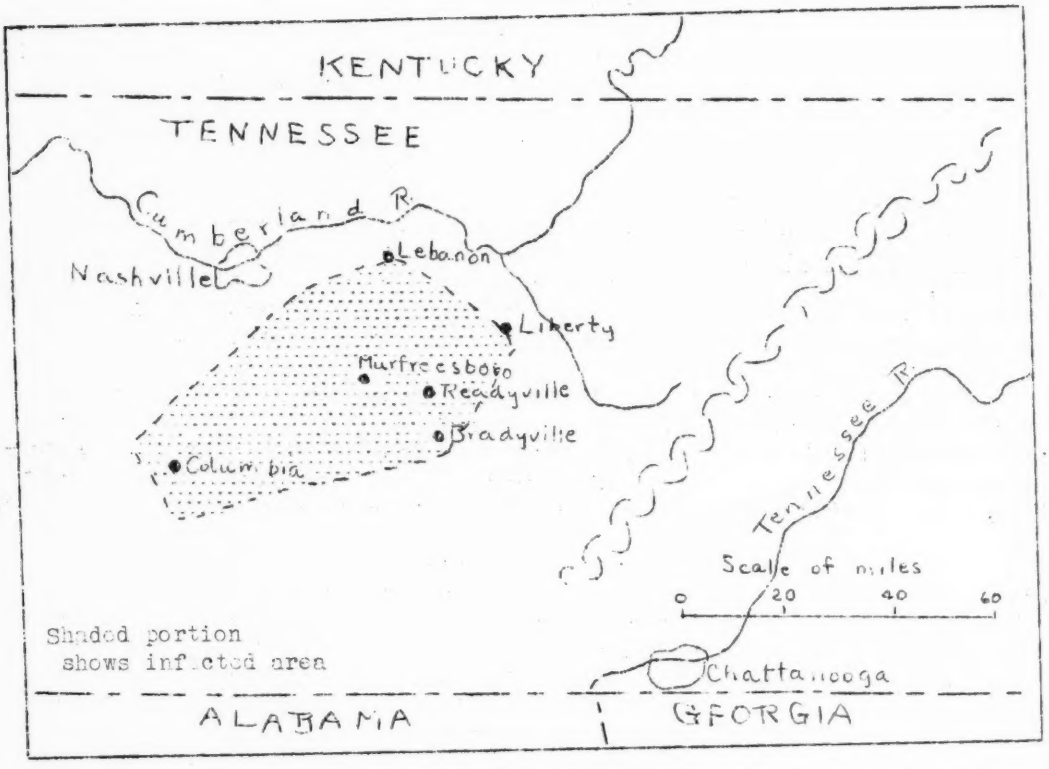


Fig. 50. Area known to be infected by persimmon wilt at the close of 1937 scouting season.

At the time scouting activities for persimmon wilt, caused by a species of Cephalosporium (Crandall, Bowen S. and Ross W. Davidson. Cephalosporium wilt of persimmon. Pl. Dis. Rptr. 21:251-252. July 15, 1937), were suspended for the season an area of some 1,500 square miles had been found to contain infected trees (Fig. 50). On the area as a whole 50 percent of the persimmon stands contained infected trees. While sufficient scouting has now been done to indicate that the limits of the area as shown above are reasonably accurate, any reports of the occurrence of the disease outside this area will be appreciated. The disease has not been found in any other locality in the United States. Reports of the suspected occurrence of this disease, accompanied by specimens, should be sent to the Division of Forest Pathology, U. S. Department of Agriculture, Washington, D. C.

BRIEF NOTES ON PLANT DISEASES

SWEET CORN BACTERIAL WILT IN OHIO: Losses due to Stewart's disease (Aplanobacter stewarti) are negligible in Ohio this year. Insect damage has so masked symptoms of wilt that one could not confidently determine where disease was present without resorting to cultural methods. No specimens have been sent to us. Plantings made from seed carrying 3 to 5 percent infection were found to have about the same amount of disease. In such cases infections were most conspicuous on the secondary shoots. (R. C. Thomas, Sept. 27).

SCAB ON FIRETHORN: Two specimens of scab on Pyracantha coccinea have been received recently, from opposite ends of the country. One was collected in a nursery in Montgomery County, Maryland, August 16, by Dr. R. J. Haskell, who states that the disease ruined the appearance of the berries. The other was sent by Dr. Frank P. McWhorter from Oregon, with the comment that scab is abundant in western Oregon almost every fall but that it seems to be more serious than usual this season.

Of the various names that have been applied to the fungus, the combination Fusicladium pyracanthae (Otth.) Rostrup is probably best, according to Mr. John A. Stevenson.